US Army Corps of Engineers.
Construction Engineering Research Laboratory

Fact Sheet

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FURY - AN UNDERGROUND TANK INSPECTION SYSTEM

The Problem

In the Department of Defense (DOD), the Army alone has more than 20,000 underground storage tanks (USTs). Nationwide, this number is estimated to be over 300,000. Although the December 22, 1998 deadline of Federal regulation (40 CFR 280-281) requiring that all of these tanks be brought into regulatory compliance to avoid environmental contamination has passed, states are selective enforced this requirement . Since replacing all existing USTs would be prohibitively expensive and monitoring UST what are currently in compliance is a continuing requirement, a cost-effective, reliable assessment methods are needed to support informed decisions on UST management. Especially important are methods that can determine if there are alternatives to replacement such as lining and cathodic protection.

The Technology

Fury is an automated robotic sensor delivery inspection system for internal examination of USTs that store various types of fuel. After removal or transfer of the contents, the robot enters the tanks through an existing riser (minimum 4-inch diameter) and navigates both the end caps and cylindrical wall area on magnetically coupled wheels. The robot uses an ultrasonic transducer to make numerous measurements of the tank wall thickness.

Fury is being developed by the U.S. Army Construction Engineering Research Laboratory(CERL) in conjunction with RedZone Robotics, Inc., of Pittsburgh, PA. This effort is being funded by the Small Business Innovation Research Program (SBIR), the Environmental Security Technology Certification Program (ESTCP) and the Army Petroleum Center. A submersible (but not in fuel) Fury is now available.

Benefits/Savings

Fury can perform internal UST inspections faster and with less labor than existing procedures, with the further advantage of not interrupting normal operations. A typical Fury inspection will take about a half day as compared to 2-5 days for current methods. In addition, the robot is operated remotely, eliminating the worker hazard and complications associated with in-tank inspection procedures.

Fury complies with the recently approved American Society for Testing and Materials (ASTM) Standard G158-98 for assessing the condition of buried steel tanks. Data from the inspection will allow DOD installations to make intelligent choices concerning replacement or upgrading and also help managers set priorities/schedules for work on USTs based on more accurate condition information. Fury can then be used periodically to do preventative maintenance inspections in satisfying Environmental Protection Agency (EPA) requirements.

Status

Fury also has demonstrated its feasibility to examine the condition of other types of metal structures. In August 1998 the FURY system was used to assess the corrosion condition of twelve

selected underwater sites of the sheet pile bulkheads along the Cuyahoga River in Cleveland Ohio. This test identified that the corrosion product or scale on 50+ year-old sheet pile is very adherent and considerable different from the minor mill scale found inside USTs. Redesign of the scrapers and brushes currently on Fury as well as it's water-proofing will be necessary before it can be used for widespread sheet piling evaluations. Fury would offer an economical alternative to the conventional diver survey method that requires a 4 man crew (one diver in the water, a line tender, 2nd diver at the ready, and a boat driver). Fury has the potential to 1) offer least 1/2 cost savings, and, 2) take over a 100 times as many measurements in the same time. Nationally, a large number lot of sheet pile bulk heads along U.S. inland waterways are approaching the end of their design lives and require condition evaluations.

Since Fury is a sensor delivery system it offers an opportunity to do other types of remote sensing such as the assessment of the degree of zebra mussel infestation. These and other possible uses are under evaluation as well as preliminary discussions on commercialization of this sensor delivery system.

Points of Contact

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